

**WHAT IS CLAIMED IS:**

5 1. A method of operating internetworking devices, comprising the steps of:  
providing a plurality of the internetworking devices in a stack  
configuration for interconnecting networks; and

configuring said stack of internetworking devices such that said stack of  
internetworking devices appear as a single said internetworking device to said  
interconnected networks.

10 2. The method of Claim 1, wherein the internetworking device in the step of  
providing is a switch.

15 3. The method of Claim 2, wherein the internetworking device in the step of  
providing is a Layer 2 switch.

4. The method of Claim 2, wherein the internetworking device in the step of  
providing is a Layer 3 switch.

20 5. The method of Claim 2, wherein the internetworking devices in the step of  
providing are a mix of Layer 2 and Layer 3 switches.

25 6. The method of Claim 2, wherein a software agent external to said stack of  
switches communicates with said stack of switches for management thereof, via a  
software interface module provided in the step of configuring.

7. The method of Claim 6, wherein said software agent communicates with a  
single switch of said stack of switches.

8. The method of Claim 7, wherein said single switch in the step of providing said stack of switches, is elected as a master switch, and said software agent communicates only with said elected master switch.

5 9. The method of Claim 8, wherein if said elected master switch fails, a new master switch is elected, and said newly elected master switch then communicates with said software agent.

10 10. The method of Claim 9, wherein said elected master switch has associated therewith a master IP address, and when said master switch fails, said newly elected master switch assumes said master IP address.

15 11. The method of Claim 2, wherein each switch in the step of providing said stack of switches further performs a step of advertising its discovered stack neighbors to other said stack switches.

12. The method of Claim 11, wherein each said switch in the step of advertising advertises on a periodic basis.

20 13. The method of Claim 11, wherein in response to the step of advertising, each said stack switch builds a complete topology map of the said stack configuration which is current.

25 14. The method of Claim 13, wherein each said stack switch builds a minimal cost spanning tree, and elects a select one of said stack of switches as a master switch based upon said topology map, said minimal cost spanning tree breaking all loops in said current stack configuration.

15. The method of Claim 2, wherein one or more of said switches are hot swappable.

16. The method of Claim 2, wherein the step of configuring further comprises a step of providing of software algorithms which are resident in each of said switches of said stack.

17. The method of Claim 1, wherein in the step of configuring, said stack of internetworking devices appear as said single internetworking device with respect to a spanning tree protocol.

18. The method of Claim 1, wherein when one of said internetworking devices of said stack in the step of providing is elected as a master, said master internetworking device communicates stack-wide configuration information to the remaining internetworking devices, which are slaves.

19. The method of Claim 18, wherein if stored stack-wide configuration of said slave is different from said stack-wide information communicated from said master, said stack-wide information communicated from said master overwrites said stored stack-wide information of said slave.

20. The method of Claim 18, wherein a configuration command received by said master from a management station is globally distributed to each said slave.

21. The method of Claim 1, wherein each of said internetworking devices in the step of providing comprises a local database of MAC addresses learned locally, and a remote database of MAC addresses learned from one or more remote internetworking nodes, and each of said internetworking devices executes a database synchronization algorithm which synchronizes table entries of said remote database with an external

database of said one or more remote internetworking devices.

22. The method of Claim 21, wherein a database entry of said local database which is learned locally from a non-stack port is advertised to every internetworking node.

23. The method of Claim 1, wherein in the step of configuring, said stack of internetworking devices behave externally as a single router.

24. The method of Claim 23, wherein said internetworking devices are switches, and for said stack to behave as said single router, at least one of said internetworking devices must be a Layer-3 capable switch.

25. The method of Claim 24, wherein when said stack behaves as said single router, all said switches of said stack which are Layer-3 capable route packets substantially simultaneously.

26. The method of Claim 25, wherein a packet routed through said stack which behaves a said single router is routed exactly once by one of said Layer-3 capable switches.

27. The method of Claim 23, wherein said stack is configured with N routing interfaces, each having a unique route interface IP address.

28. The method of Claim 24, wherein each said switch of said stack elects its own head router, which said head router for said Layer-3 capable switch, is said Layer-3 capable switch.

29. The method of Claim 28, wherein said head router for a Layer-2 capable

switch is a nearest said Layer-3 capable switch in its stack tree.

5           30.     A method of operating internetworking devices, comprising the steps of:  
              providing a plurality of the switches in a stack configuration for  
              interconnecting networks; and  
              configuring said stack of switches such that said stack of switches appear  
              as a single said switch to said interconnected networks.

10           31.     The method of Claim 30, wherein each said switch of said stack of  
              switches in the step of providing periodically establishes adjacency with discovered stack  
              neighbors in order to develop a complete topology map.

15           32.     The method of Claim 31, wherein each said switch of said stack of  
              switches builds a stack tree and elects a master switch based upon said complete  
              topology map.

            33.     The method of Claim 32, wherein said master switch executes a routing  
            protocol when a routing function is provided.

20           34.     The method of Claim 33, wherein at least one of said switches of said  
              stack must be a Layer-3 capable switch in order to provide said routing function.

25           35.     The method of Claim 30, wherein said stack of switches in the step of  
              configuring operate in accordance with a stack-wide configuration information, which  
              said stack-wide configuration information is stored in each said switch of said stack.

            36.     A system for the operation internetworking devices, comprising:  
                    a plurality of the internetworking devices in a stack configuration for  
            interconnecting networks;

wherein said stack of internetworking devices is configured such that said stack of internetworking devices appear as a single said internetworking device to said interconnected networks.

5           37.     The system of Claim 36, wherein the internetworking device is a switch.

          38.     The system of Claim 37, wherein the internetworking device is a Layer 2 switch.

10          39.     The system of Claim 37, wherein the internetworking device is a Layer 3 switch.

          40.     The system of Claim 37, wherein the internetworking devices are a mix of Layer 2 and Layer 3 switches.

15          41.     The system of Claim 37, wherein a software agent external to said stack of switches communicates with said stack of switches for management thereof, via a software interface module.

20          42.     The system of Claim 41, wherein said software agent communicates with a single switch of said stack of switches.

25          43.     The system of Claim 42, wherein said single switch of said stack of switches, is elected as a master switch, and said software agent communicates only with said elected master switch.

          44.     The system of Claim 43, wherein if said elected master switch fails, a new master switch is elected, and said software agent communicates with said newly elected master switch.

45. The system of Claim 44, wherein said elected master switch has associated therewith a master IP address, and when said master switch fails, said newly elected master switch assumes said master IP address.

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46. The system of Claim 37, wherein each switch of said stack of switches advertises its discovered stack neighbors to other said stack switches.

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47. The system of Claim 46, wherein each said switch advertises on a periodic basis.

48. The system of Claim 46, wherein each said stack switch builds a complete topology map of the said stack configuration which is current.

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49. The system of Claim 48, wherein each said stack switch builds a minimal cost spanning tree, and elects a select one of said stack of switches as a master switch based upon said topology map, said minimal cost spanning tree breaking all loops in said current stack configuration.

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50. The system of Claim 37, wherein one or more of said switches are hot swappable.

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51. The system of Claim 37, wherein software algorithms are resident in each of said switches of said stack to facilitate said stack appearing as said single switch.

52. The system of Claim 36, wherein said stack of internetworking devices appear as said single internetworking device with respect to a spanning tree protocol.

53. The system of Claim 36, wherein when one of said internetworking

devices is elected as a master, said master internetworking device communicates stack-wide configuration information to the remaining internetworking devices, which are slaves.

5           54.     The system of Claim 53, wherein if stored stack-wide configuration of said slave is different from said stack-wide information communicated from said master, said stack-wide information communicated from said master overwrites said stored stack-wide information of said slave.

10           55.     The system of Claim 53, wherein a configuration command received by said master from a management station is globally distributed to each said slave.

15           56.     The system of Claim 36, wherein each of said internetworking devices comprises a local database of MAC addresses learned locally, and a remote database of MAC addresses learned from one or more remote internetworking nodes, and each of said internetworking devices executes a database synchronization algorithm which synchronizes table entries of said remote database with an external database of said one or more remote internetworking devices.

20           57.     The system of Claim 56, wherein a database entry of said local database which is learned locally from a non-stack port is advertised to every internetworking node.

25           58.     The system of Claim 36, wherein said stack of internetworking devices behave externally as a single router.

          59.     The system of Claim 58, wherein said internetworking devices are switches, and for said stack to behave as said single router, at least one of said internetworking devices must be a Layer-3 capable switch.



60. The system of Claim 59, wherein when said stack behaves as said single router, all said switches of said stack which are Layer-3 capable route packets substantially simultaneously.

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61. The system of Claim 60, wherein a packet routed through said stack which behaves as a said single router is routed exactly once by one of said Layer-3 capable switches.

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62. The system of Claim 58, wherein said stack is configured with N routing interfaces, each having a unique route interface IP address.

63. The system of Claim 59, wherein each said switch of said stack elects its own head router, which said head router for said Layer-3 capable switch, is said Layer-3 capable switch.

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64. The system of Claim 63, wherein said head router for a Layer-2 capable switch is a nearest said Layer-3 capable switch in its stack tree.

65. A system for the operation of internetworking devices, comprising:  
a plurality of the switches in a stack configuration for interconnecting networks;

wherein said stack of switches is configured such that said stack of switches appear as a single said switch to said interconnected networks.

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66. The system of Claim 65, wherein each said switch of said stack of switches periodically establishes adjacency with discovered stack neighbors in order to develop a complete topology map.

67. The system of Claim 66, wherein each said switch of said stack of switches builds a stack tree and elects a master switch based upon said complete topology map.

5 68. The system of Claim 67, wherein said master switch executes a routing protocol when a routing function is provided.

69. The system of Claim 68, wherein at least one of said switches of said stack must be a Layer-3 capable switch in order to provide said routing function.

10 70. The system of Claim 65, wherein said stack of switches operate in accordance with a stack-wide configuration information, which said stack-wide configuration information is stored in each said switch of said stack.